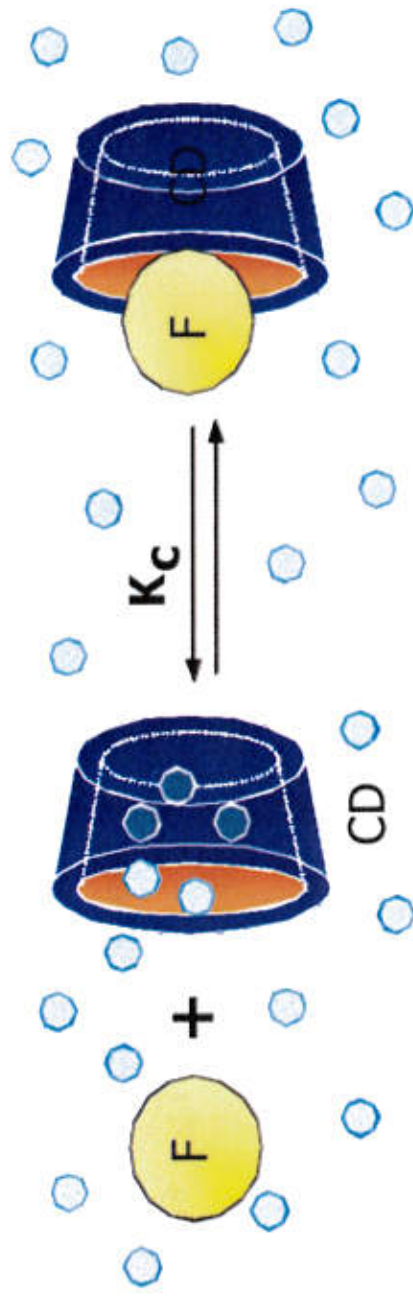
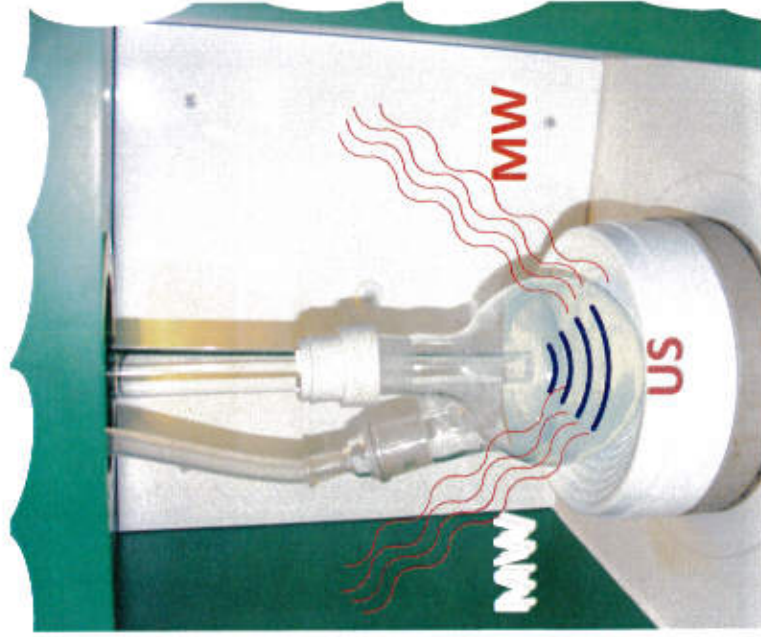
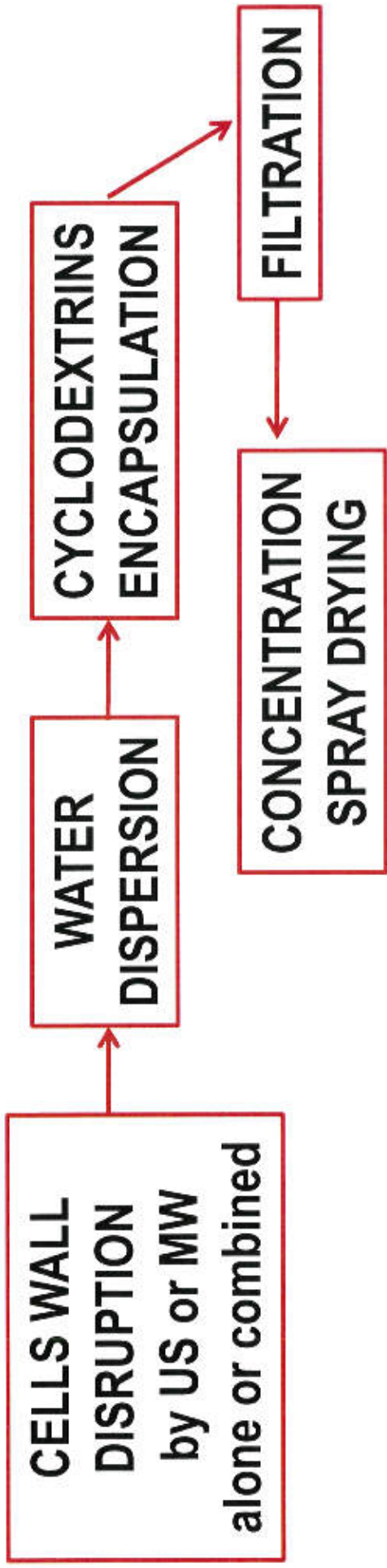
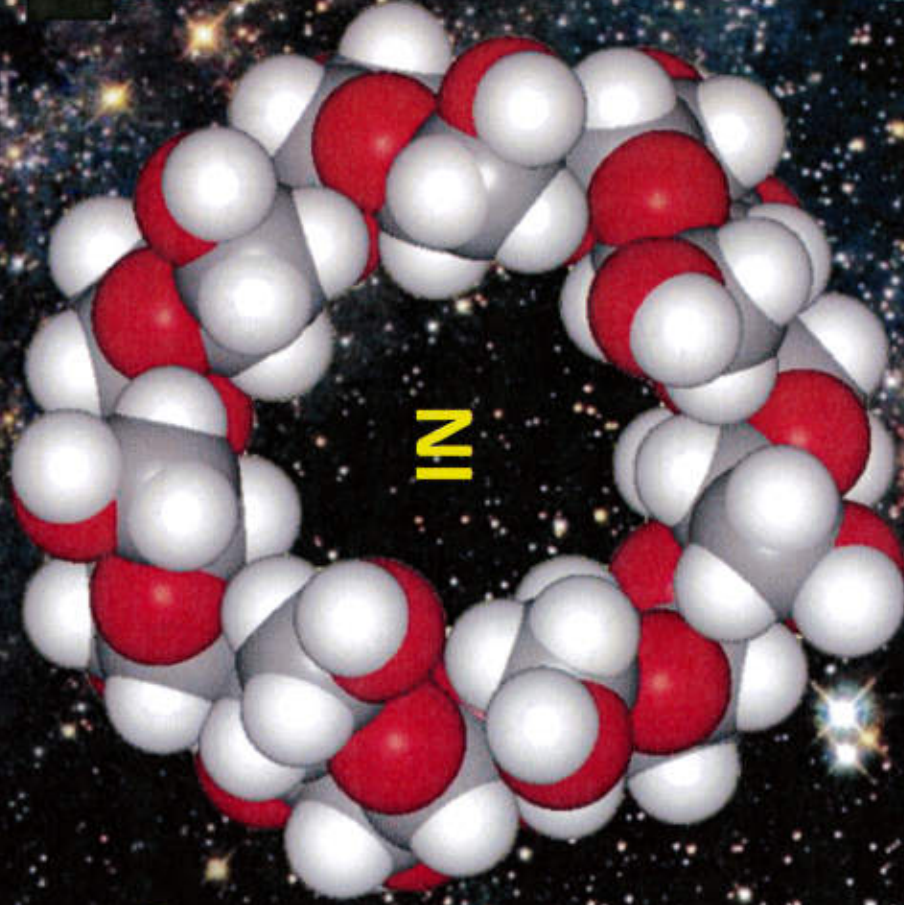


NEW CONCEPT OF ECO-EXTRACTION



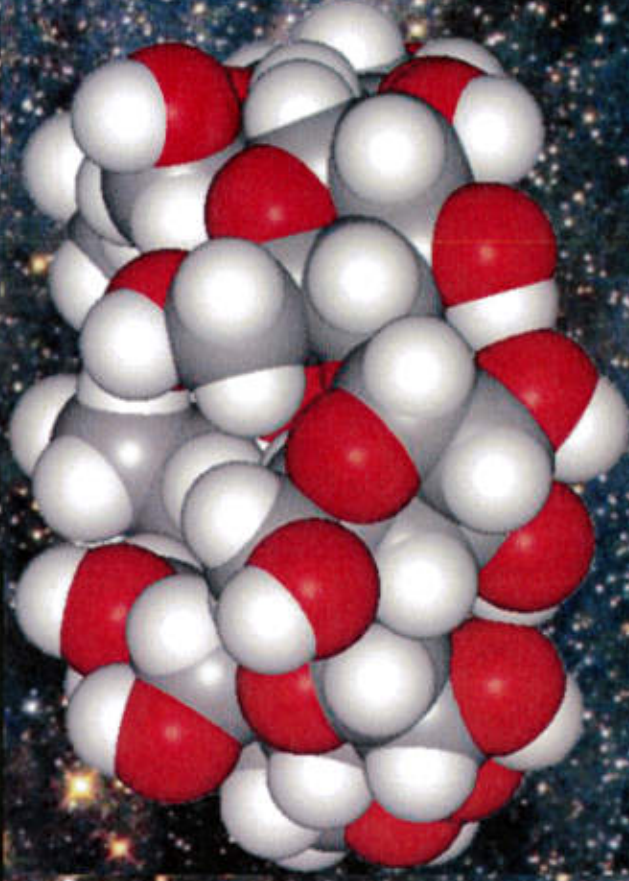
NANOCAVITIES WITHIN CYCLODEXTRINS

TOP VIEW



OUT

SIDE VIEW



UP

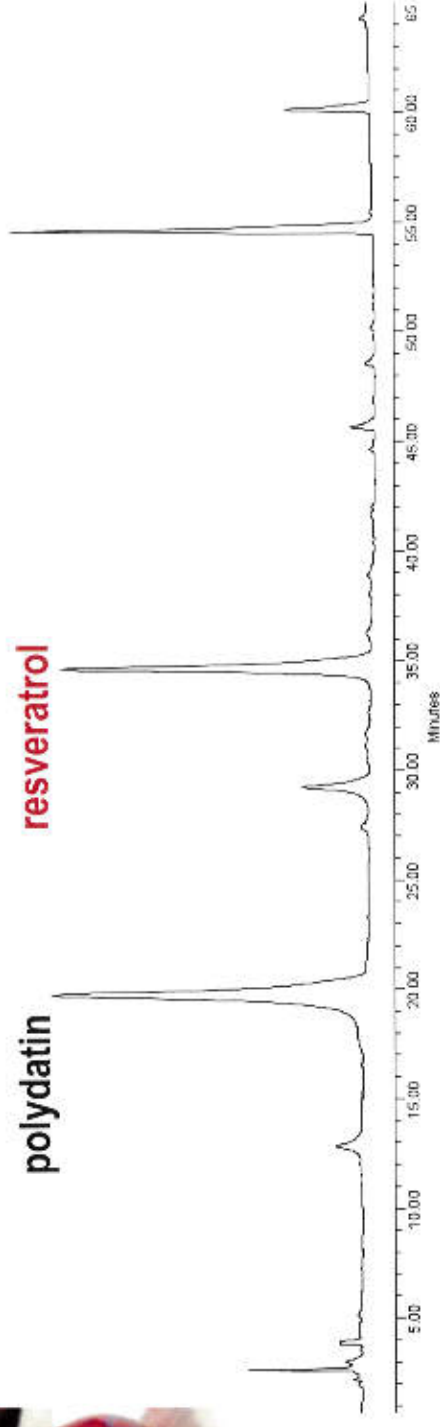
DOWN

A one-pot ultrasound-assisted water extraction/cyclodextrin encapsulation of resveratrol from *Polygonum cuspidatum*

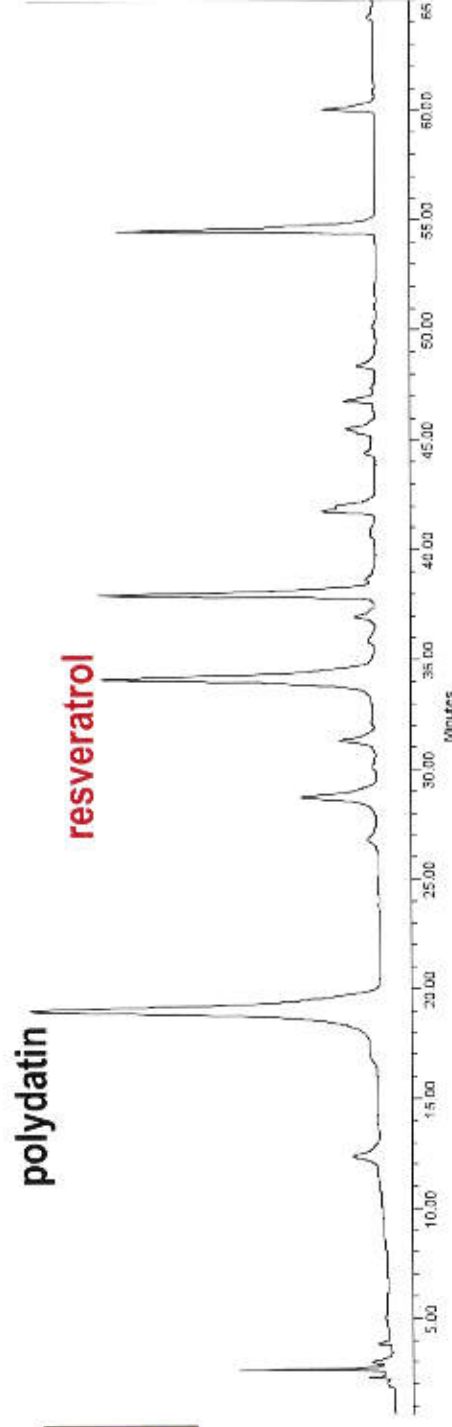
Cravotto, G. et al. *Food Chemistry* 2012, 130, 746-750.



β -CD H₂O extract



HPLC chromatograms



methanol extract

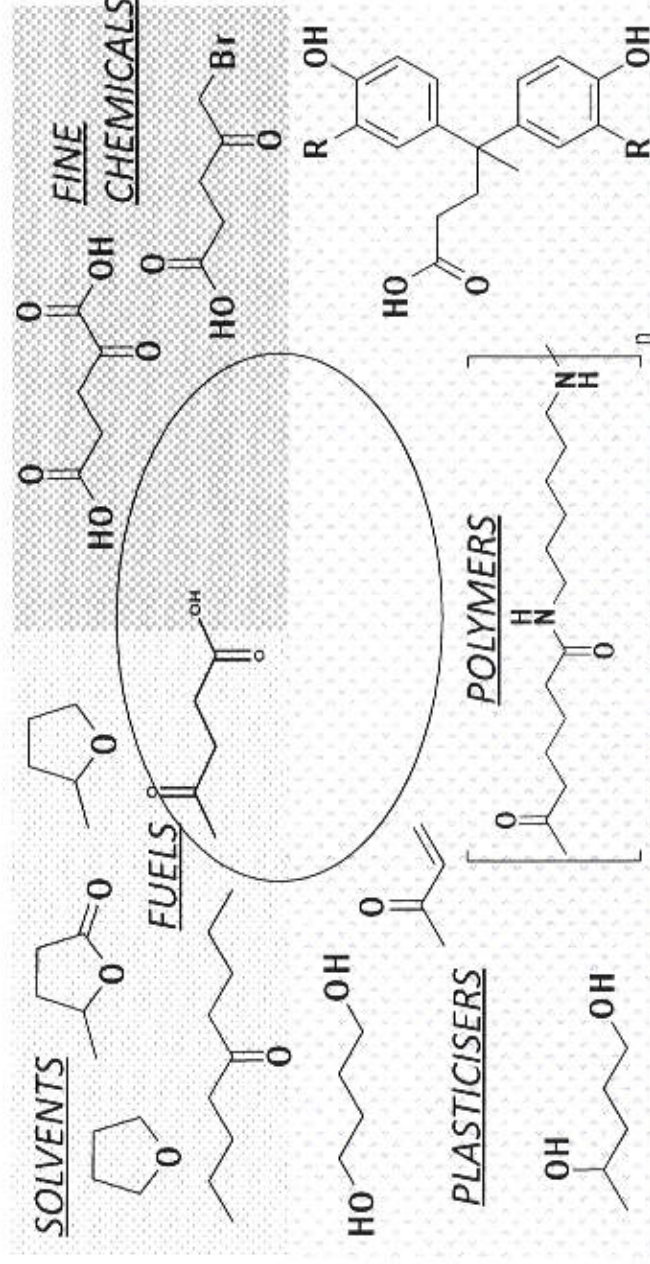
Cite this: DOI: 10.1039/c0xx00000x

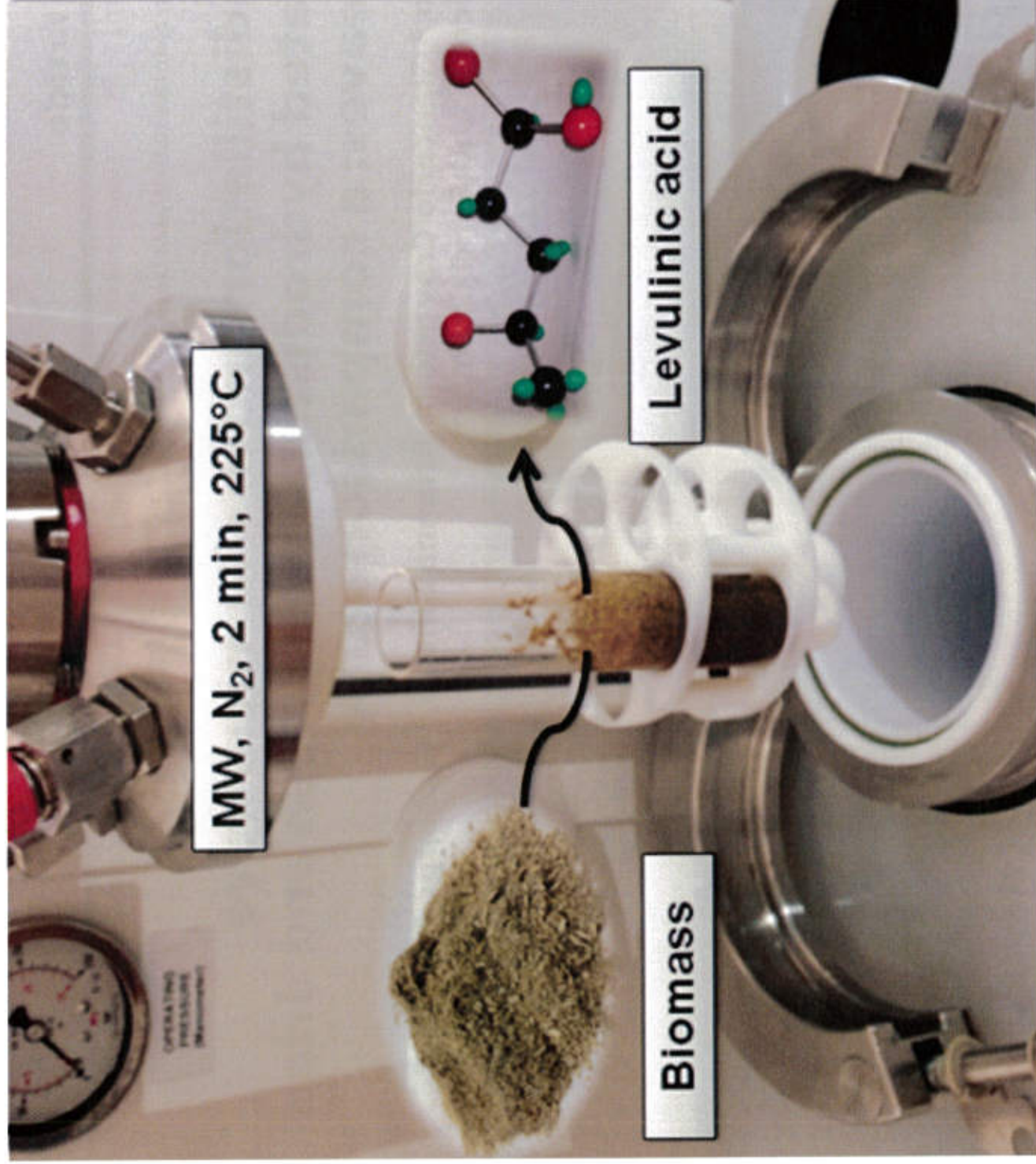
www.rsc.org/xxxxxx

COMMUNICATION

Microwave-assisted flash conversion of non-edible polysaccharides and post-harvest tomato plant waste to levulinic acid

Silvia Tabasso,^a Enzo Montoneri,^a Diego Carnaroglio,^b Marina Caporaso^b and Giancarlo Cravotto^{b*}





Received: 29 January 2012

Revised: 11 April 2012

Accepted: 13 April 2012

Published online in Wiley Online Library: 12 June 2012

(wileyonlinelibrary.com) DOI 10.1002/jsfa.5730

Hydrodistillation and *in situ* microwave-generated hydrodistillation of fresh and dried mint leaves: a comparison study

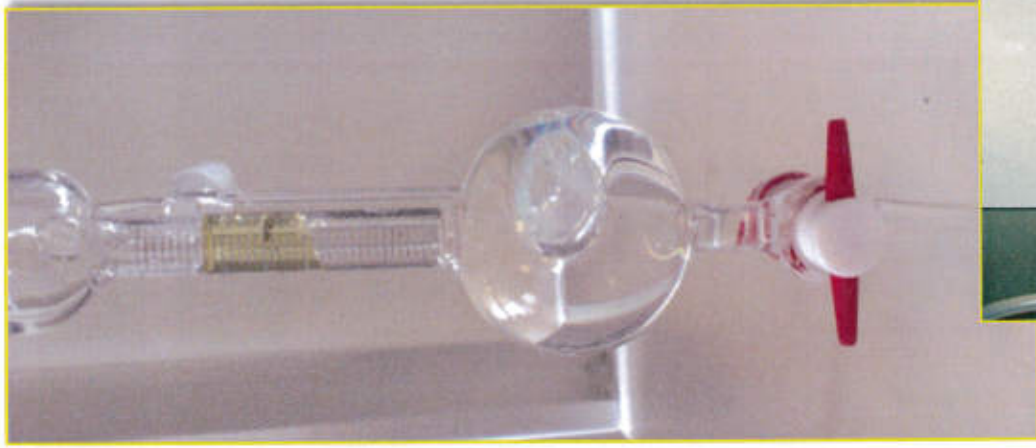
Laura Orio,^a Giancarlo Cravotto,^{a*} Arianna Binello,^a Giuseppe Pignata,^b Silvana Nicola^b and Farid Chemat^c



Mentha spicata L. var. *viridis*,

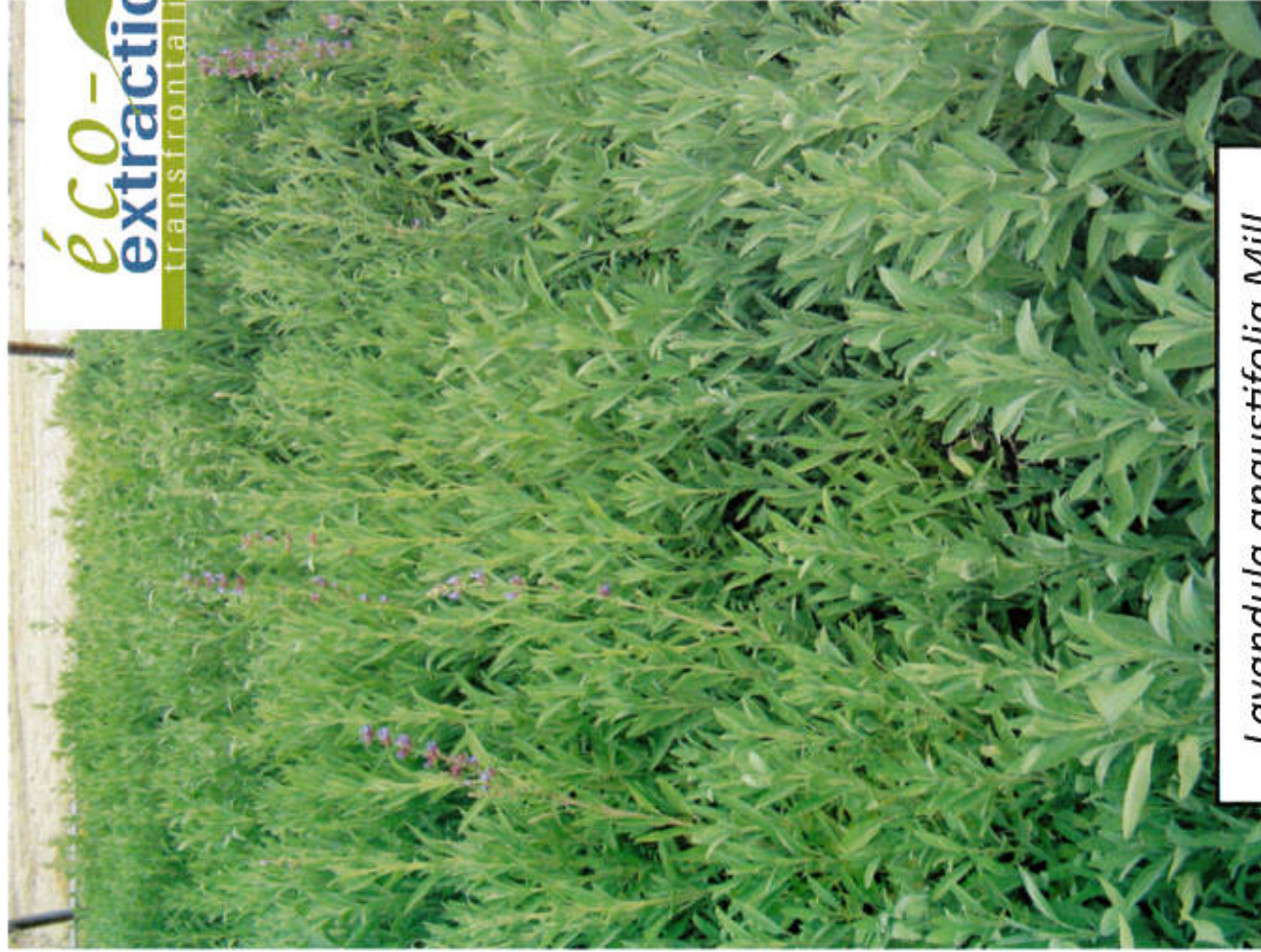
éco-
extraction
transfrontalière





ECO-EXTRACTION: INVESTIGATIONS - RESULTS





Lavandula angustifolia Mill.

éco-
extraction
transfrontalière



[www.unical.it]



Origanum vulgare L. ssp. *hirtum* (Link)

Main components of *Lavandula angustifolia* Mill. EO

	MAII (%)	HD (%)
α -Pinene	0.53	0.46
Camphene	0.78	0.50
β -Phellandrene	0.30	0.50
β -Pinene	0.45	0.66
β -Myrcene	1.08	1.81
(+)- δ 3-Carene	4.28	5.19
<i>m</i> -Cymene	0.59	0.65
<i>p</i> -Cymene	1.13	1.43
Terpinene	6.97	14.29
1,8-Cineole	6.47	10.51
(E)- β -Ocimene	3.10	2.00
(Z)- β -Ocimene	1.71	1.18
3-Carene	0.38	0.54
Linalool	11.16	6.34
Octen-1-ol acetate	0.35	0.52
D-Camphor	1.17	0.87
Borneol	7.93	6.02
(R)-Lavandulol	1.13	0.47
Terpinen-4-ol	1.00	0.61
<i>p</i> -Cymen-8-ol	0.41	0.20
Cryptone	0.81	0.55
α -Terpineol	0.57	0.60
Linalyl anthranilate	3.60	4.32
L- α -bornyl acetate	0.42	0.20
Methyl ester 3,7-dimethyl-1,6-octadien-3-yl ester	2.58	1.36
Neryl acetate	0.25	0.36
Lavandulyl acetate	3.86	1.74
(-)- α -Cedrene	0.43	0.47
β -Caryophyllene	9.66	9.37
α -Bergamotene	0.76	0.87
Germacrene D	0.63	0.67
(E)- β -Farnesene	0.61	0.47
β -Cubebene	1.09	0.77
α -Muurolene	5.22	4.82
Caryophyllene oxide	5.69	5.22
γ -Gurjunene	0.68	0.63
(+)-Epi-bicyclosesquiphellandrene	6.91	7.04
TOT	94.71	94.22

Main components of *Origanum vulgare* L. ssp. *hirtum* (Link) Ietswaart leaves EO

	MAH (%)	HD (%)
α -Thujene	0.60	--
α -Pinene	0.39	--
Sabinene	3.96	1.75
β -Thujene	1.61	0.90
α -Carene	3.71	3.53
<i>p</i> -Cymene	2.06	1.77
3- <i>p</i> -Menthene	1.58	1.25
γ -Terpinene	11.18	10.95
<i>c</i> - β -Terpinol	2.32	2.25
Terpinolene	1.21	1.65
<i>t</i> -Sabinene hydrate	18.98	12.30
Linalool	1.22	1.30
Octen-1-ol acetate	0.81	1.11
3-Carene	0.71	0.88
<i>c</i> -Sabinenhydrate	0.36	0.40
4-Terpineol	10.16	13.81
α -Terpineol	1.99	1.86
Linalyl anthranilate	2.31	4.73
<i>p</i> -Thymol	26.64	20.94
β -Caryophyllene	1.85	3.83
α -Cayophyllene	0.21	0.47
β -Cubebene	1.41	3.45
γ -Elemene	1.18	2.22
β -Bisabolene	3.11	6.13
δ -Cadinene	0.27	0.60
TOT	99.84	98.09



Ocimum basilicum L.,



Salvia officinalis subsp.



Salvia officinalis 'Extrakta'



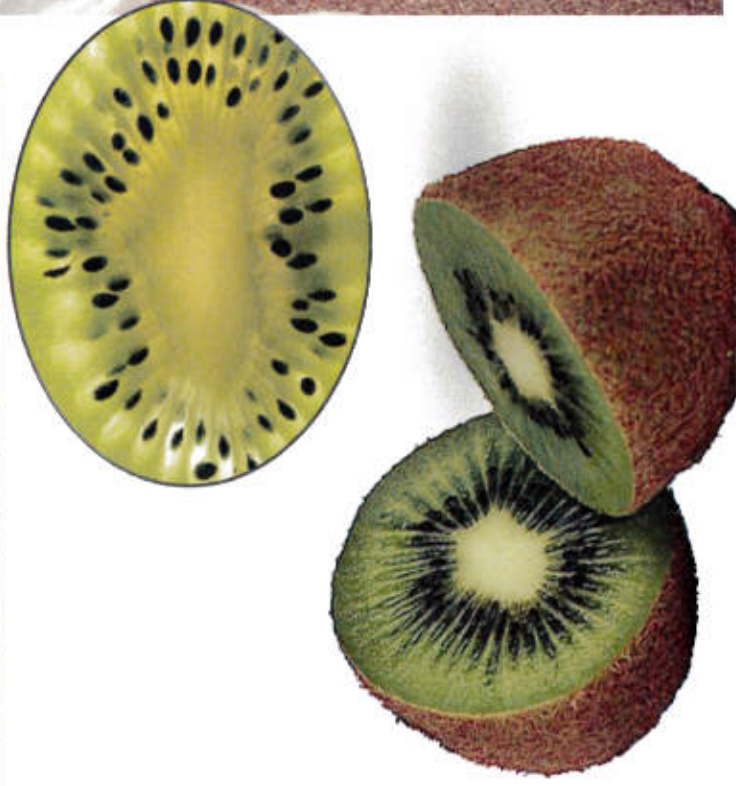
Salvia officinalis subsp. lavandulifolia



Salvia sclarea L.

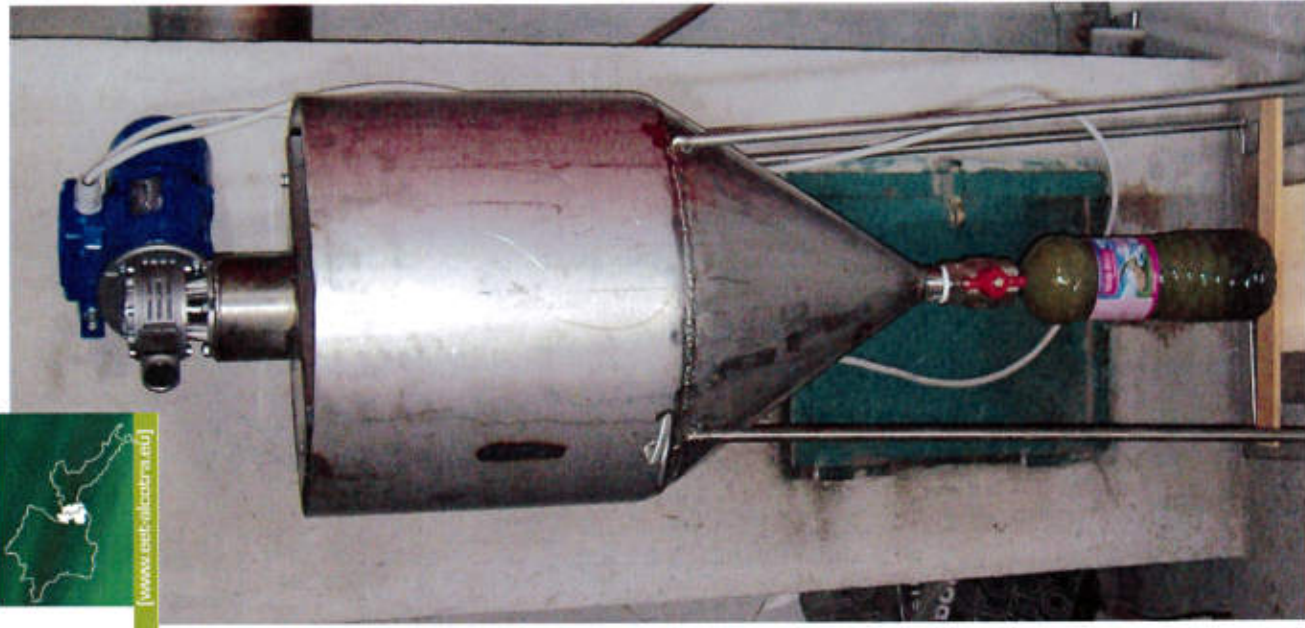
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Extraction of kiwi seed oil: Soxhlet versus four different non-conventional techniques

Giancarlo Cravotto^{a*}, Carlo Bicchi^a, Stefano Mantegna^a, Arianna Binello^a,
Valérie Tomao^b and Farid Chemat^b



SEEDS EXPLOSION PRESS

éco-
extraction
transnationale



www.eco-extraction.fr



KIWI SEEDS OIL COMPOSITION AND YIELD

	Soxhlet	MW	SC-CO ₂	US	MIS
Oil content (oil/seed w % \pm SD)	28.3 \pm 1.0	27.8 \pm 1.0	26.8 \pm 0.5	28.9 \pm 1.0	28.0 \pm 1.0
Time	8 h	20 min	2.5 h	30 min	30 min
Temperature	69°C ^a	80°C	40°C	50°C	69°C ^a
\sum SFAs	12.57	9.32	11.55	8.94	6.12
\sum MUFAs	19.89	15.18	18.82	14.79	15.03
\sum PUFAs	67.54	75.50	69.63	76.27	75.68
MUFAs/PUFAs	0.29	0.20	0.27	0.19	0.20

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ECO-EXTRACTS OF GRAPE LEAVES, VINE-SHOOTS AND GRAPE RESIDUES



éco-extraction
transfrontalière



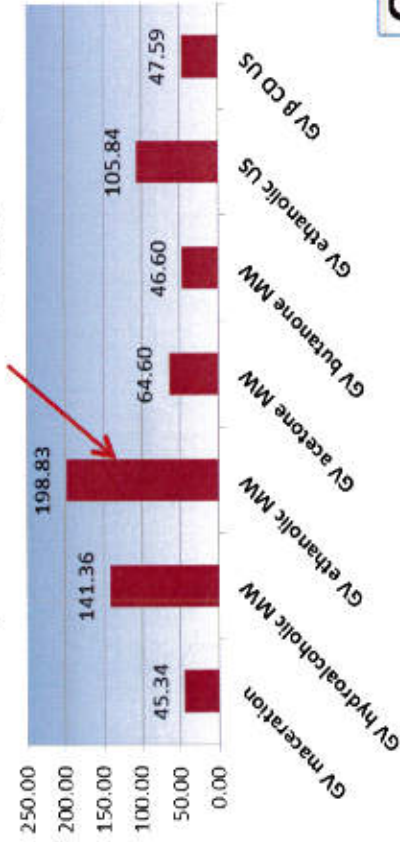
[www.ecoextra.eu]



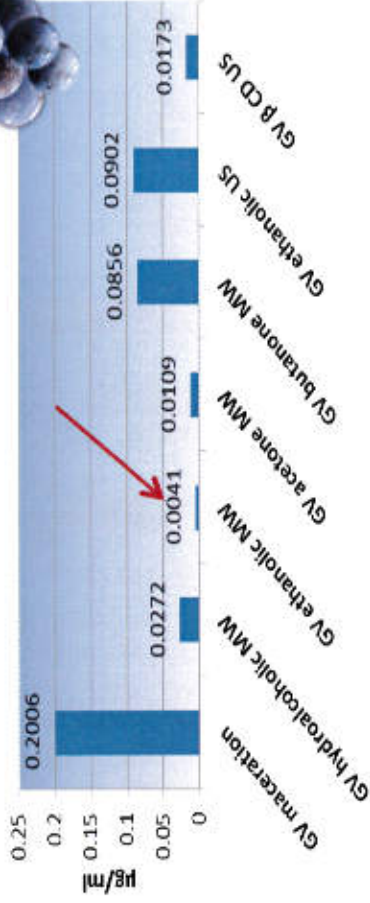


GRAPE VINES

Total phenolic content (mg/g GAE)

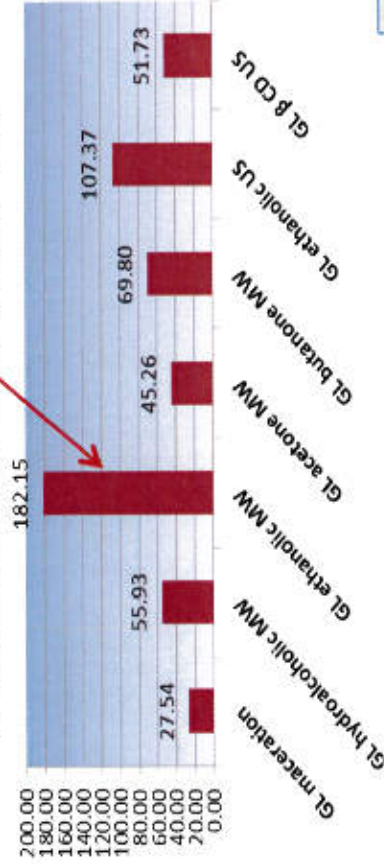


Antioxidant activity (EC50)

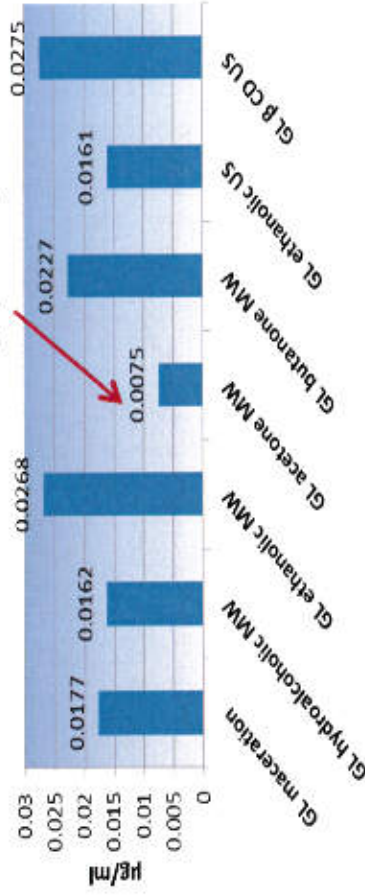


GRAPE LEAVES

Total phenolic content (mg/g GAE)

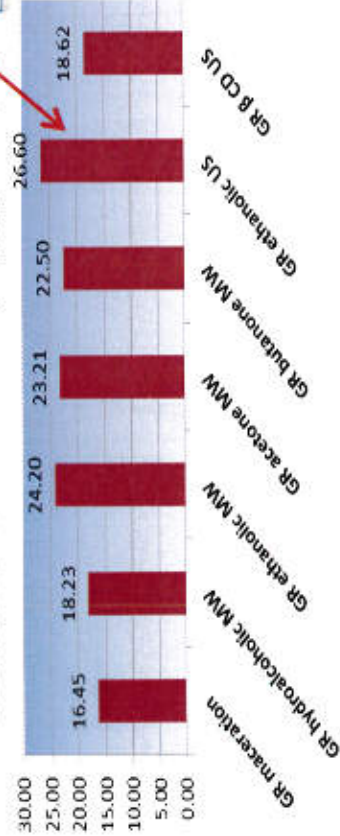


Antioxidant activity (EC50)

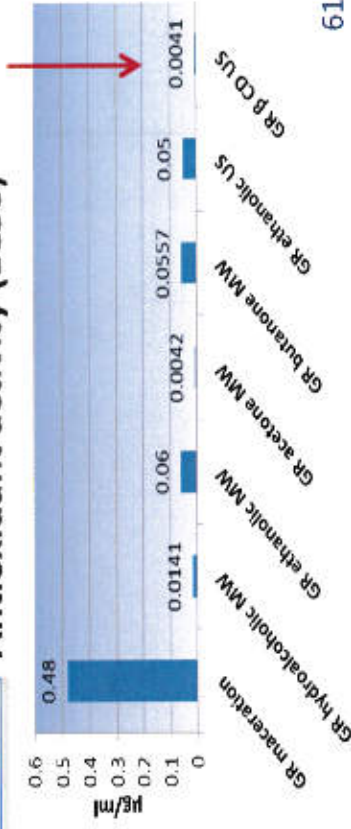


GRAPE RESIDUE

Total phenolic content (mg/g GAE)

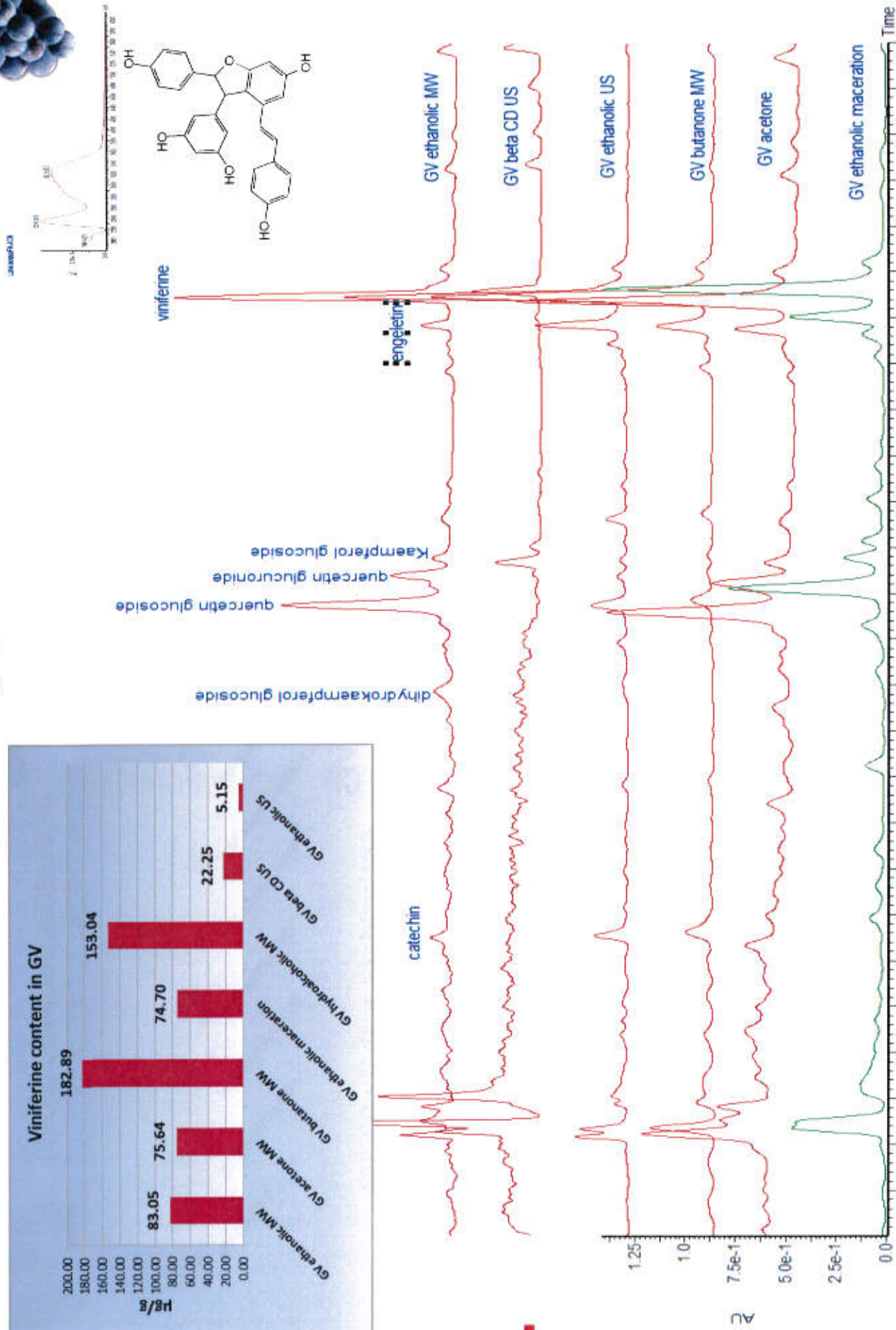
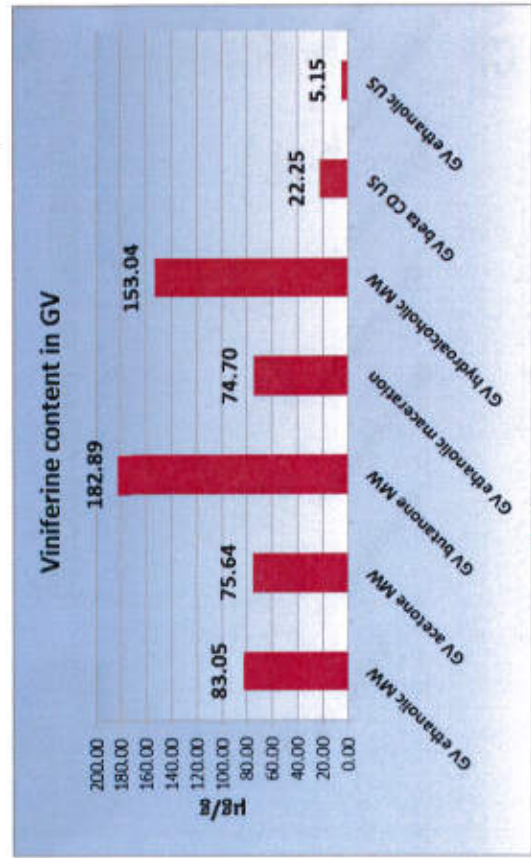


Antioxidant activity (EC50)





HPLC-UV profiles of grape vines extracts



Extraction: energy consumption



UAE: high-power probe system with an immersion titanium horn; v 21.1 kHz



Energy of the extraction process= **0.0535 kWh**

MAE: using SynthWAVE: high MW power density of 1.5kW/L and powerful stirring



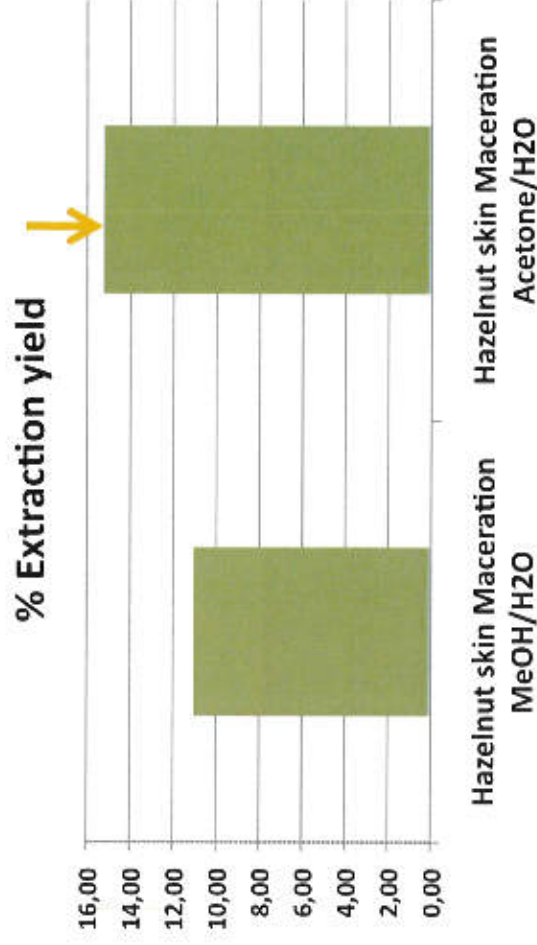
Energy of the extraction process= **0.075 kWh**

MACERATION of hazelnut skins using MeOH/H₂O and Acetone/H₂O

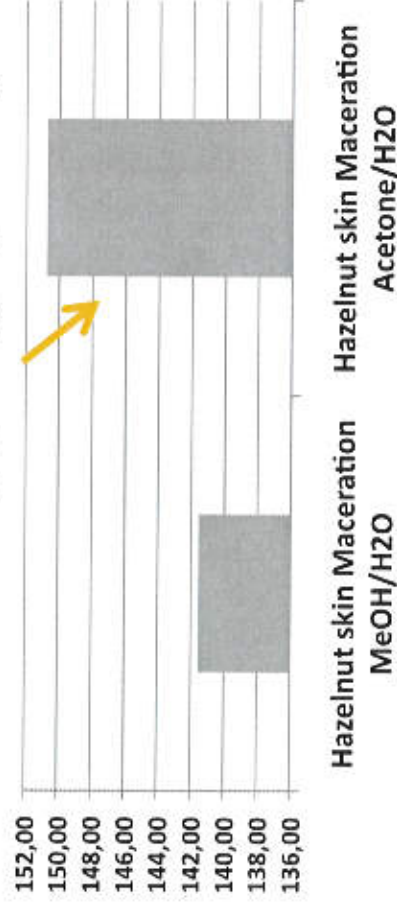
éco-extraction
transfrontalière



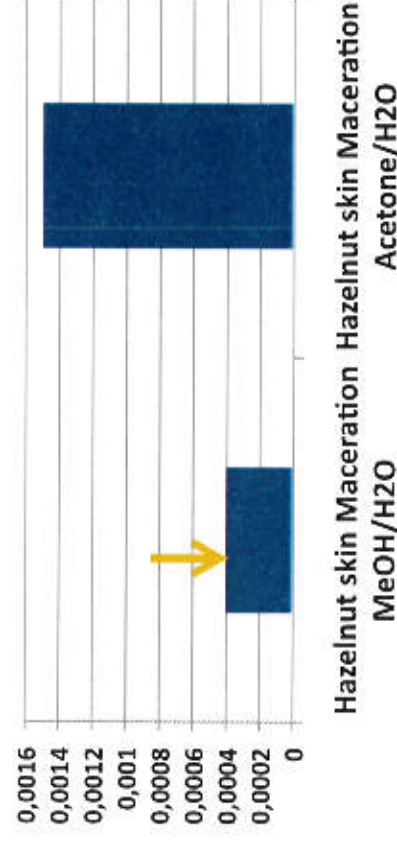
[www.eecolabtra.eu]



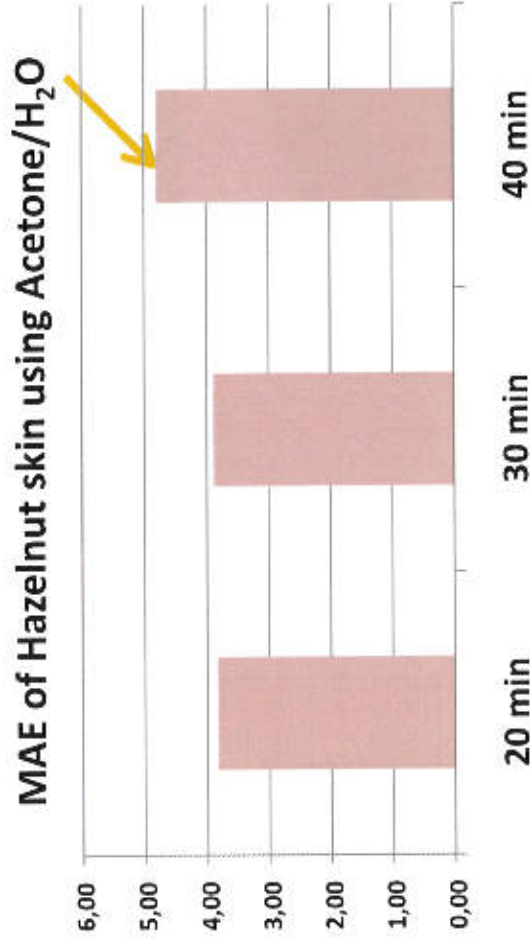
Phenolic content (mg GAE/g dry extract)



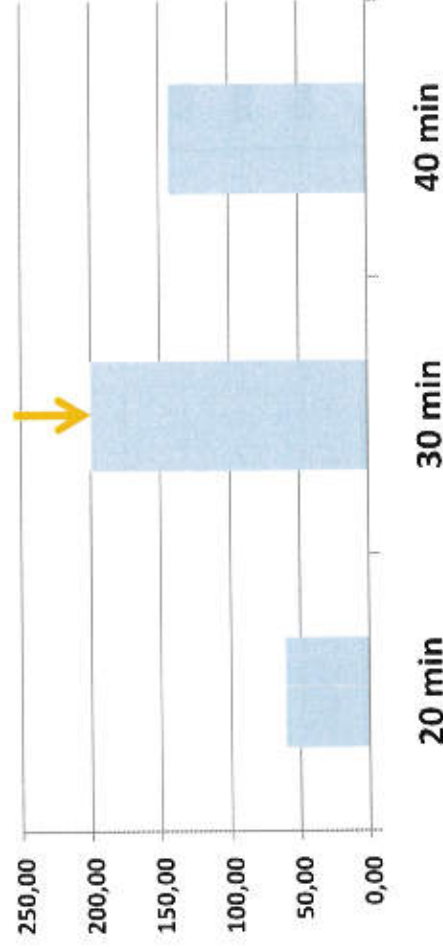
Antioxidant activity (EC₅₀)



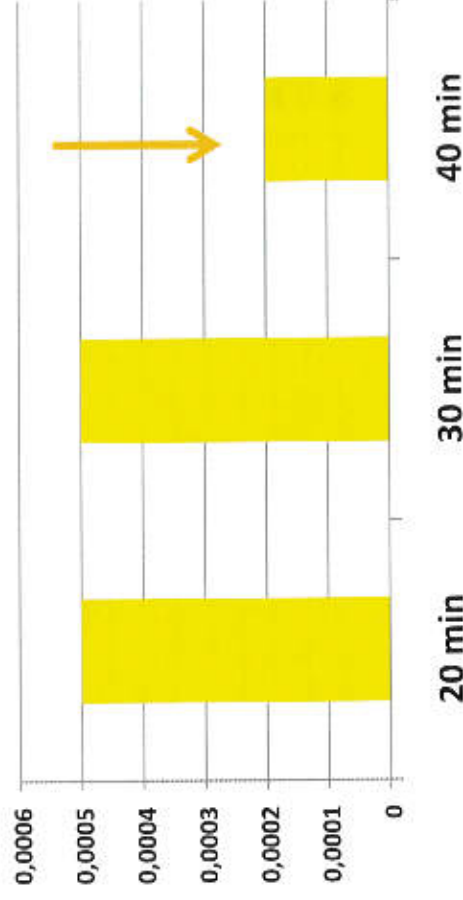
MAE of hazelnut skins using Acetone/H₂O



Phenolic content (mg GAE/g dry extract)



Antioxi-dant activity (EC₅₀)



MAE of hazelnut skins using MeOH/H₂O

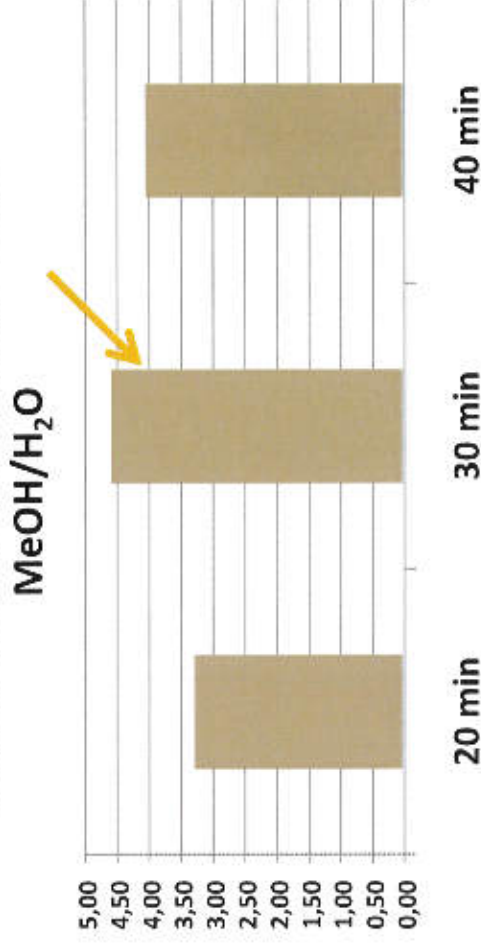
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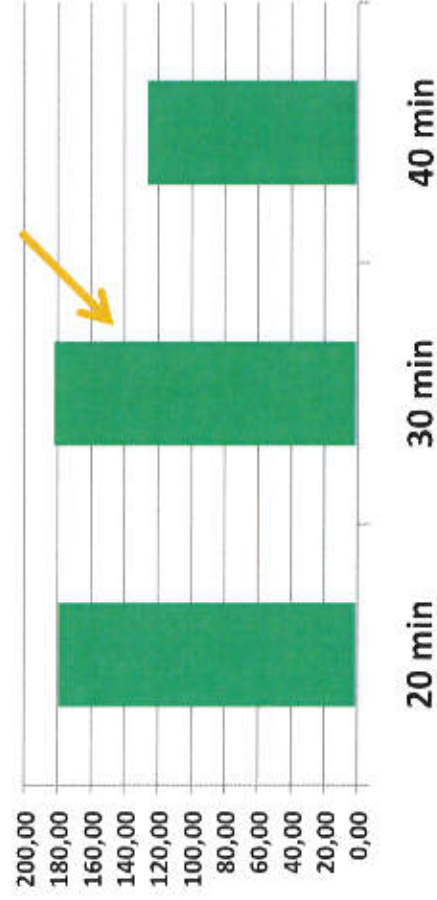
[www.icevalcortina.edu]



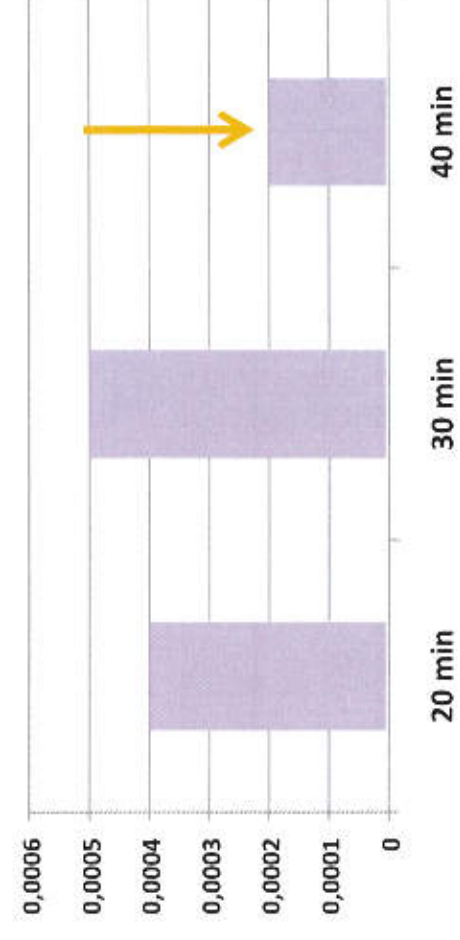
% MAE yield of Hazelnut skin using MeOH/H₂O



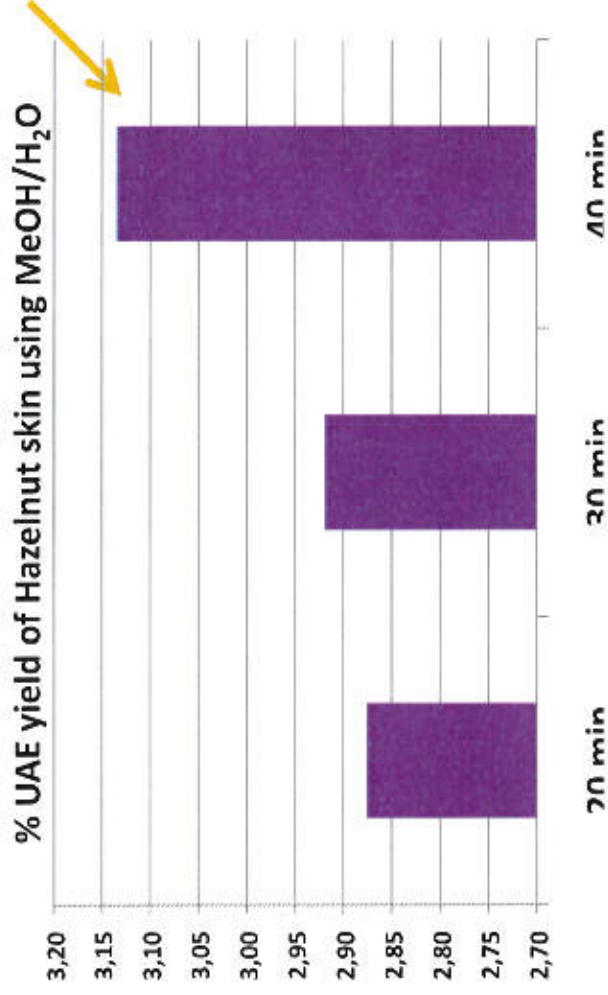
Phenolic content (mg GAE/g dry extract)



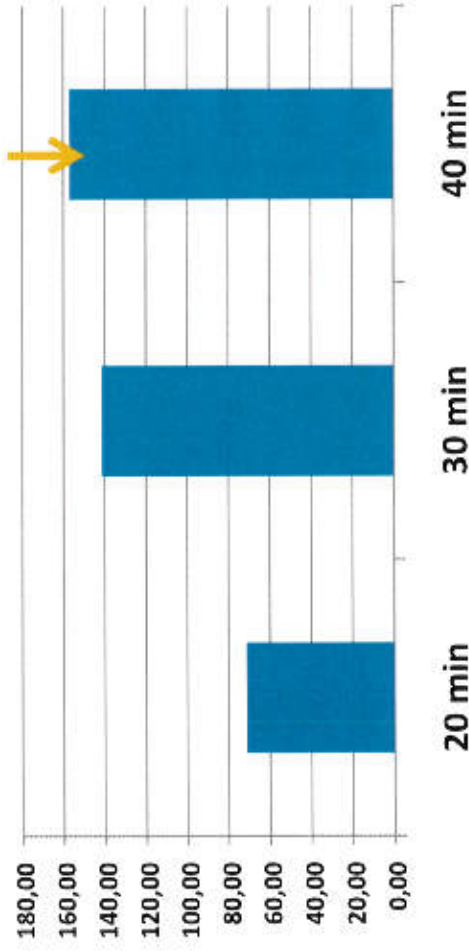
Antioxidant activity (EC₅₀)



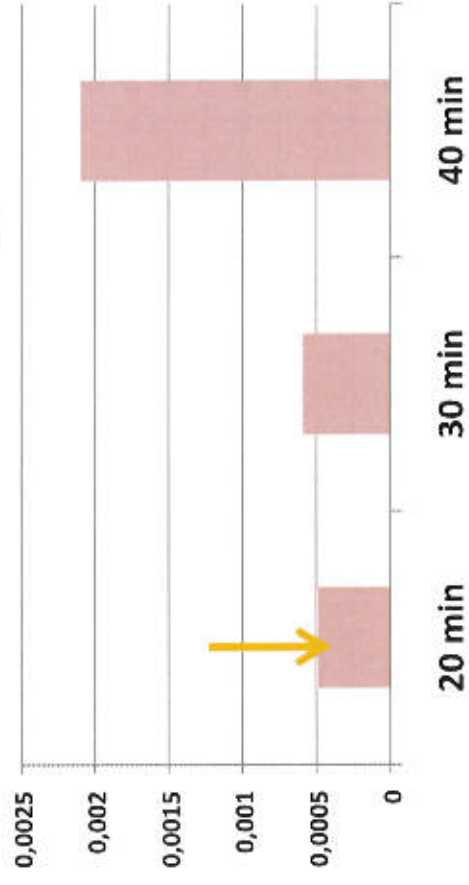
UAE of hazelnut skins using MeOH/H₂O



Phenolic content (mg GAE/g dry extract)



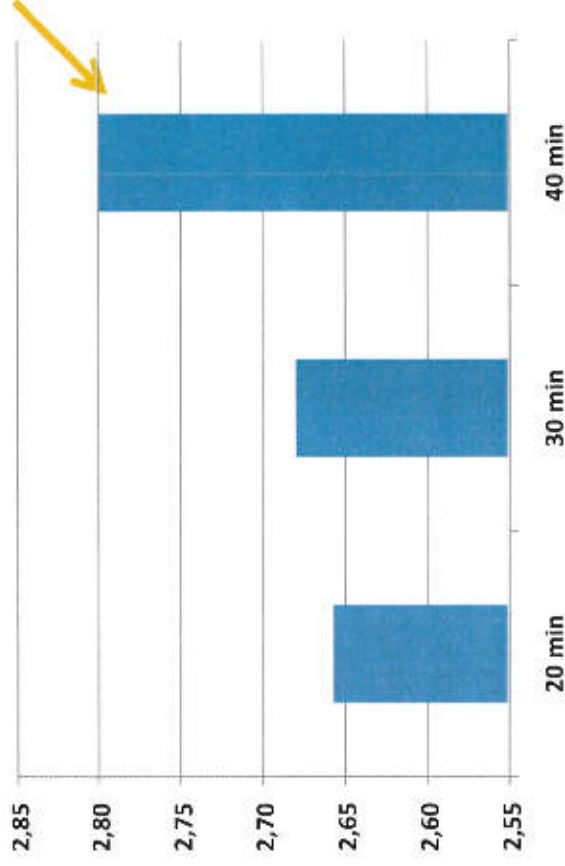
Antioxidant activity (EC₅₀)



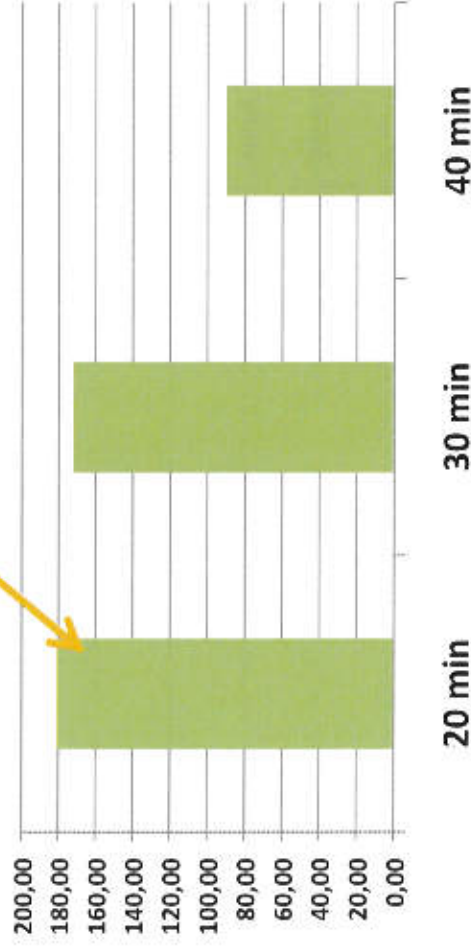
UAE of hazelnut skins using Acetone/H₂O



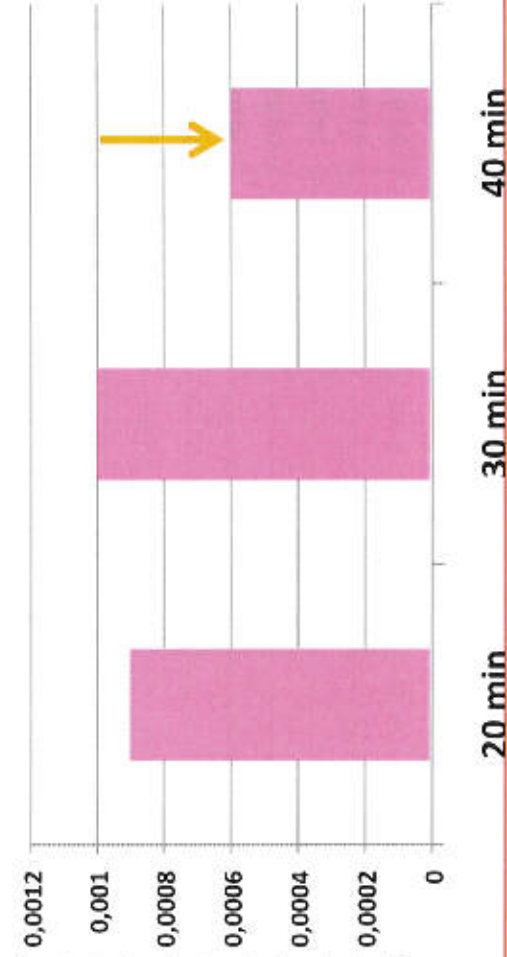
% UAE of Hazelnut skins using Acetone/H₂O



Phenolic content (mg GAE/g dry extract)



Antioxydant activity (EC50)



Extraction: energy consumption



Ultrasound-assisted extraction:

Energy of the extraction process (MeOH/H₂O)

- **30 min- 0,160 kWh**

Energy of the extraction process (Acetone/H₂O)

- **30 min- 0,155 kWh**



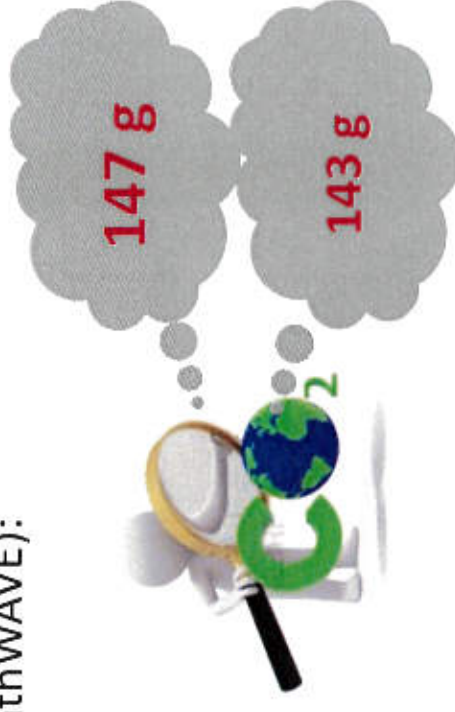
Microwave assisted extraction (SynthWAVE):

Energy of the extraction process (MeOH/H₂O)

0,184 kWh

Energy of the extraction process (Acetone/H₂O)

0,179 kWh



DATA - INFORMATION - KNOWLEDGE - WISDOM



Chem. Soc. Rev., 2013, 42, 6754--6776

GRAZIE!

MERCI!

THANK YOU!

**éco-
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www.eco-extraction.eu

